HYDRAULIC TABLES.

APPLICABLE FOR WATER PIPES AND SEWERS.

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TABLE I.

S=The sine of the slope=$\frac{h}{l}$=the hydraulic inclination in one foot.

F=The fall in feet per mile, or the height in feet due to friction per mile of length.

I=The mean hydraulic inclination=$\frac{l}{h}$.

l=The length of the pipe or sewer.

h=The head due to friction.

For most purposes, and where the pipe or sewer is long, h may be regarded as the total head.

This table was originally prepared—without the column of velocities—with the view to simplify calculations for velocity and discharge by means of M. DuBuat's formula expressed in English inches

$$V=\frac{306.596\,(r^{\frac{1}{2}}-.1032)}{\left(\frac{I}{S}\right)^{\frac{1}{2}}-hyp.\ log.\left(\frac{I}{S}+1.6\right)^{\frac{1}{2}}}-.2906\,(r^{\frac{1}{2}}-.1032)$$

in which V = the velocity in inches per second.

r = the mean radius or hydraulic depth in inches.

S = the sine of the slope;

and also to facilitate similar calculations by means of Mr. Leslie's table of constants given in Beardmore's Hydrology, where $\sqrt{\frac{l}{h}}$ is first required to be found; and from Mr. Neville's table* for finding the velocity in feet per second, from the product of the hydraulic mean depths and hydraulic inclinations.

The application of the table for these purposes needs no explanation.

The column of velocities will be found serviceable in determining the velocity and discharge not only through a 12 inch pipe, but—with the aid of Table 2—those for any pipe or sewer can readily be obtained.

The velocities have been calculated from DuBuat's formula, as given above, which reduced for a 12 inch pipe, becomes

$$V=\frac{499.40}{\left(\frac{I}{S}\right)^{\frac{1}{2}}-hyp.\ log.\left(\frac{I}{S}+1.6\right)^{\frac{1}{2}}}-.47$$

The results are in all cases a little less than those given in table viii of Mr. Neville's work, (page 431). This difference will be explained by referring to that work, (page 195). The formula used by Mr. Neville, in constructing his table viii, being

$$V=\frac{307\,(r^{\frac{1}{2}}-.1)}{\left(\frac{I}{S}\right)^{\frac{1}{2}}-hyp.\ log.\left(\frac{I}{S}+1.6\right)^{\frac{1}{2}}}-.3\,(r^{\frac{1}{2}}-.1)$$

the results from which are stated to be in excess of the true quantities.

The inclinations given in the table are from .01 foot per 100 to 15 per 100 feet, which are sufficient to meet all ordinary requirements.

This table is also particularly adapted to the use of engineers who are in the habit of registering inclinations in feet per 100, as it is only necessary to remove the decimal point two places to the right, in the first column, in order to obtain the corresponding inclination per 100 feet. The table, therefore, becomes a useful tab. of gradients, as it gives not only the rise or fall in unity, but the equivalent inclination in feet per mile and the distance required to rise or fall one foot.

*Neville's Hydraulic Tables, Co-efficient and Formula, page 220, second edition.

Hydraulic Tables, Applicable for Water Pipes and Sewers; by E. H. Keating.

SLIP

To be inserted between pages 80 and 81 in the "Report of Proceedings of the Fourth Annual Meeting of the American Water Works Association." 1884.

ERRATA.

In the heading to the 3rd column, throughout Table 1.—For "*one inch*" read *one in.*

On page 85, 2nd column.—For "51.734" read 51.744.

On page 87, 2nd column.—For "96.625" read 96.624.

On page 92, 3rd column of Table 2.—For "1.090" read 1.000.

		One Inch.		
.0001	0.528	10,000.00	100.00	4.76
.0002	1.056	5,000.00	70.71	7.04
.0003	1.584	3,333.33	57.73	8.83
.0004	2.112	2,500.00	50.00	10.36
.0005	2.640	2,000.00	44.72	11.73
.0006	3.168	1,666.67	40.83	12.98
.0007	3.696	1,428.57	37.80	14.15
.0008	4.224	1,250.00	35.36	15.23
.0009	4.752	1,111.11	33.33	16.27
.0010	5.280	1,000.00	31.62	17.26
.0011	5.808	909.09	30.15	18.20
.0012	6.336	833.33	28.87	19.10
.0013	6.864	769.23	27.74	19.98
.0014	7.392	714.29	26.73	20.83
.0015	7.920	666.67	25.82	21.64
.0016	8.448	625.00	25.00	22.45
.0017	8.976	588.24	24.26	23.23
.0018	9.504	555.56	23.57	24.00
.0019	10.032	526.32	22.94	24.74
.0020	10.560	500.00	22.36	25.46
.0021	11.088	476.19	21.82	26.17
.0022	11.616	454.55	21.32	26.86
.0023	12.144	434.78	20.85	27.55
.0024	12.672	416.67	20.41	28.23
.0025	13.200	400.00	20.00	28.89
.0026	13.728	384.62	19.61	29.54
.0027	14.256	370.37	19.25	30.18
.0028	14.784	357.14	18.90	30.82
.0029	15.312	344.83	18.57	31.44
.0030	15.840	333.33	18.26	32.04
.0031	16.368	322.58	17.96	32.64
.0032	16.896	312.50	17.68	33.24
.0033	17.424	303.03	17.41	33.83
.0034	17.952	294.12	17.15	34.43
.0035	18.480	285.71	16.90	35.00
.0036	19.008	277.78	16.67	35.56
.0037	19.536	270.27	16.44	36.14
.0038	20.064	263.16	16.22	36.69
.0039	20.592	256.41	16.02	37.22
.0040	21.120	250.00	15.81	37.79
.0041	21.648	243.90	15.62	38.30
.0042	22.176	238.10	15.43	38.85
.0043	22.704	232.56	15.25	39.38

S Sine of the Slope = $\frac{h}{l}$	F Fall per Mile in Feet.	$\frac{I}{S} = I$ Mean Hydraulic Inclination $\frac{l}{h}$ One Inch.	$\left(\frac{I}{S}\right)^{½} = \sqrt{I}$ or $\sqrt{\frac{l}{h}}$	Velocity in Inches per Second in 12″ Pipe.
.0044	23.232	227.27	15.08	39.90
.0045	23.760	222.22	14.91	40.43
.0046	24.288	217.39	14.75	40 94
.0047	24.816	212.77	14.59	41.46
.0048	25.344	208.33	14.44	41.96
.0049	25.872	204.08	14.29	42.47
.0050	26.400	200.00	14.15	42.96
.0051	26.928	196.08	14.00	43.45
.0052	27.456	192.31	13.87	43.96
.0053	27.984	188.68	13.74	44.44
.0054	28.512	185.19	13.61	44.93
.0055	29.040	181.82	13.48	45.42
.0056	29.568	178.57	13.36	45.90
.0057	30.096	175.44	13.25	46.33
.0058	30.624	172.41	13.13	46.82
.0059	31.152	169.49	13.02	47.27
.0060	31.680	166.67	12.91	47.73
.0061	32.208	163.93	12.80	48.25
.0062	32.736	161.29	12.70	48.68
.0063	33.264	158.73	12.60	49.12
.0064	33.792	156.25	12.50	49.57
.0065	34.320	153.85	12.40	50.07
.0066	34.848	151.52	12.31	50.49
.0067	35.376	149.25	12.22	50.94
.0068	35.904	147.06	12.13	51.39
.0069	36.432	144.93	12.04	51.82
.0070	36.960	142.86	11.95	52.26
.0071	37.488	140.85	11.87	52.66
.0072	38.016	138.89	11.79	53.11
.0073	38.544	136.99	11.71	53.52
.0074	39.072	135.14	11.63	53.93
.0075	39.600	133.33	11.55	54.35
.0076	40.128	131.58	11.47	54.83
.0077	40.656	129.87	11.40	55.21
.0078	41.184	128.21	11.32	55.70
.0079	41.712	126.58	11.25	56.09
.0080	42.240	125.00	11.18	56.47
.0081	42.768	123.46	11.11	56.86
.0082	43.296	121.95	11.04	57.33
.0083	43.824	120.48	10.98	57.67
.0084	44.352	119.05	10.91	58.15
.0085	44.880	117.65	10.85	58.49
.0086	45.408	116.28	10.78	58.98
.0087	45.936	114.94	10.72	59.34
.0088	46.464	113.64	10.66	59.77

S Sine of the Slope $= \frac{h}{l}$	F Fall per Mile in Feet.	$\frac{I}{S} = I$ Mean Hydraulic Inclination $\frac{l}{h}$ One Inch.	$\left(\frac{I}{S}\right)^{1/2} = \sqrt{I}$ or $\sqrt{\frac{l}{h}}$	Velocity in Inches per Second in 12″ Pipe.
.0089	46.992	112.36	10.60	60.14
.0090	47.520	111.11	10.54	60.51
.0091	48.048	109.89	10.48	60.96
.0092	48.576	108.70	10.43	61.26
.0093	49.104	107.53	10.37	61.72
.0094	49.632	106.38	10.31	62.11
.0095	50.160	105.26	10.26	62.51
.0096	50.688	104.17	10.21	62.82
.0097	51.216	103.09	10.15	63.31
.0098	51.734	102.04	10.10	63.65
.0099	52.272	101.01	10.05	63.97
.0100	52.800	100.00	10.00	64.39
.0101	53.328	99.01	9.95	64.81
.0102	53.856	98.04	9.90	65.15
.0103	54.384	97.087	9.85	65.59
.0104	54.912	96.154	9.80	65.94
.0105	55.440	95.238	9.76	66.30
.0106	55.968	94.340	9.71	66.65
.0107	56.496	93.458	9.67	67.02
.0108	57.024	92.593	9.62	67.38
.0109	57.552	91.743	9.58	67.75
.0110	58.080	90.909	9.53	68.12
.0111	58.608	90.090	9.49	68.51
.0112	59.136	89.286	9.45	68.89
.0113	59.664	88.496	9.41	69.18
.0114	60.192	87.719	9.37	69.57
.0115	60.720	86.957	9.33	69.87
.0116	61.248	86.207	9.29	70.27
.0117	61.776	85.470	9.25	70.67
.0118	62.304	84.746	9.21	70.98
.0119	62.832	84.034	9.17	71.38
.0120	63.360	83.333	9.13	71.70
.0121	63.888	82.645	9.09	72.12
.0122	64.416	81.967	9.05	72.54
.0123	64.944	81.301	9.02	72.86
.0124	65.472	80.645	8.98	73.19
.0125	66.000	80.000	8.94	73.52
.0126	66.528	79.366	8.91	73.85
.0127	67.056	78.740	8.87	74.30
.0128	67.584	78.125	8.84	74.61
.0129	68.112	77.519	8.805	74.92
.0130	68.640	76.923	8.77	75.23
.0131	69.168	76.336	8.74	75.54
.0132	69.696	75.758	8.70	75.90
.0133	70.224	75.188	8.67	76.25

S Sine of the Slope = $\frac{h}{l}$	*F* Fall per Mile in Feet.	$\frac{l}{S} = I$ Mean Hydraulic Inclination $\frac{l}{h}$ One Inch.	$\left(\frac{l}{S}\right)^{\frac{1}{2}} = \sqrt{I}$ or $\sqrt{\frac{l}{h}}$	Velocity in Inches per Second in 12″ Pipe.
.0134	70.752	74.627	8.64	76.60
.0135	71.280	74.074	8.605	76.94
.0136	71.808	73.529	8.57	77.28
.0137	72.336	72.993	8.54	77.62
.0138	72.864	72.464	8.51	77.95
.0139	73.392	71.942	8.48	78.29
.0140	73.920	71.429	8.45	78.63
.0141	74.448	70.922	8.42	78.97
.0142	74.976	70.423	8.39	79.31
.0143	75.504	69.930	8.36	79.64
.0144	76.032	69.444	8.33	79.98
.0145	76.560	68.965	8.305	80.32
.0146	77.088	68.493	8.275	80.66
.0147	77.616	68.027	8.25	81.00
.0148	78.144	67.568	8.22	81.33
.0149	78.672	67.114	8.19	81.67
.0150	79.200	66.667	8.165	81.99
.0151	79.728	66.225	8.14	82.31
.0152	80.256	65.789	8.11	82.63
.0153	80.784	65.359	8.085	82.95
.0154	81.312	64.935	8.06	83.27
.0155	81.840	64.516	8.03	83.59
.0156	82.368	64.103	8.005	83.91
.0157	82.896	63.694	7.98	84.23
.0158	83.424	63.291	7.955	84.55
.0159	83.952	62.893	7.93	84.87
.0160	84.480	62.500	7.905	85.19
.0161	85.008	62.112	7.88	85.51
.0162	85.536	61.728	7.855	85.83
.0163	86.064	61.350	7.83	86.15
.0164	86.592	60.976	7.81	86.47
.0165	87.120	60.606	7.785	86.79
.0166	87.648	60.241	7.76	87.11
.0167	88.176	59.880	7.74	87.43
.0168	88.704	59.524	7.715	87.75
.0169	89.232	59.172	7.69	88.07
.0170	89.760	58.824	7.67	88.39
.0171	90.288	58.480	7.65	88.70
.0172	90.816	58.140	7.625	89.01
.0173	91.344	57.803	7.60	89.32
.0174	91.872	57.471	7.58	89.63
.0175	92.400	57.143	7.56	89.94
.0174	92.928	56.818	7.54	90.25
.0177	93.456	56.497	7.515	90.56
.0178	93.984	56.180	7.495	90.87

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.0179	94.512	55.866	7.475	91.18
.0180	95.040	55.556	7.455	91.49
.0181	95.568	55.249	7.43	91.80
.0182	96.096	54.945	7.41	92.10
.0183	96.625	54.645	7.39	92.40
.0184	97.152	54.348	7.37	92.70
.0185	97.680	54.054	7.35	93.00
.0186	98.208	53.763	7.33	93.30
.0187	98.736	53.476	7.31	93.60
.0188	99.264	53.191	7.29	93.90
.0189	99.792	52.910	7.275	94.20
.0190	100.320	52.632	7.255	94 50
.0191	100.848	52.356	7.235	94.80
.0192	101.376	52.083	7.215	95.10
.0193	101.904	51.813	7.20	95.40
.0194	102.432	51.546	7.18	95.68
.0195	102.960	51.282	7.16	95.96
.0196	103.488	51.020	7.145	96 24
.0197	104.016	50.761	7.125	96.52
.0198	104.544	50.505	7.11	96.80
.0199	105.072	50.251	7.09	97.07
.0200	105.600	50.000	7.07	97.27
.0205	108.24	48.780	6.98	99.01
.0210	110.88	47.619	6.90	100 35
.0215	113.52	46.512	6.82	101.69
.0220	116.16	45.455	6.74	103.03
.0225	118.80	44.444	6.67	104.37
.0230	121.44	43.478	6.59	105.71
.0235	124.08	42.553	6.52	107.05
.0240	126.72	41.667	6.455	108 39
.0245	129.36	40.816	6.39	109.73
.0250	132.00	40.000	6.325	111.07
.0255	134.64	39.216	6.26	112.41
.0260	137.28	38.462	6.20	113.75
.0265	139.92	37.736	6.14	115.09
.0270	142.56	37.037	6.085	116.43
.0275	145.20	36.364	6.025	117.77
.0280	147.84	35.714	5.975	119.11
.0285	150.48	35.088	5.92	120.45
.0290	153.12	34.483	5.87	121.79
.0295	155.76	33.898	5.82	123.14
.0300	158.40	33.333	5.77	124.38
.0305	161.04	32.787	5.725	125.62
.0310	163.68	32.258	5.68	126.86
.0315	166.32	31.746	5.635	128.10

S Sine of the Slope = $\frac{h}{l}$	F Fall per Mile in Feet.	$\frac{l}{S} = I$ Mean Hydraulic Inclination $\frac{l}{h}$ One Inch.	$\left(\frac{l}{S}\right)^{\frac{1}{2}} = \sqrt{I}$ or $\sqrt{\frac{l}{h}}$	Velocity in Inches per Second in 12″ Pipe.
.0320	168.96	31.250	5.59	129.34
.0325	171.60	30.769	5.55	130.58
.0330	174.24	30.303	5.505	131.82
.0335	176.88	29.851	5.46	133.06
.0340	179.52	29.412	5.425	134.22
.0345	182.16	28.986	5.38	135.39
.0350	184.80	28.571	5.345	136.55
.0355	187.44	28.169	5.305	137.72
.0360	190.08	27.778	5.27	138.88
.0365	192.72	27.397	5.235	140.04
.0370	195.36	27.027	5.20	141.21
.0375	198.00	26.667	5.16	142.37
.0380	200.64	26.316	5.13	143.53
.0385	203.28	25.974	5.095	144.70
.0390	205.92	25.641	5.065	145.79
.0395	208.56	25.316	5.03	146.88
.0400	211.20	25.000	5.00	147.97
.0405	213.84	24.691	4.97	149.06
.0410	216.48	24.390	4.94	150.15
.0415	219.12	24.096	4.91	151.24
.0420	221.76	23.810	4.88	152.33
.0425	224.40	23.529	4.85	153.42
.0430	227.04	23.256	4.82	154.51
.0435	229.68	22.989	4.795	155.59
.0440	232.32	22.727	4.77	156.63
.0445	234.96	22.472	4.74	157.68
.0450	237.60	22.222	4.715	158.73
.0455	240.24	21.978	4.69	159.78
.0460	242.88	21.739	4.66	160.83
.0465	245.52	21.505	4.64	161.87
.0470	248.16	21.277	4.615	162.92
.0475	250.80	21.053	4.59	163.94
.0480	253.44	20.833	4.565	164.97
.0485	256.08	20.619	4.54	166.06
.0490	258.72	20.408	4.52	167.11
.0495	261.36	20.202	4.495	168.16
.0500	264.00	20.000	4.47	169.40
.0510	269.28	19.608	4.43	171.40
.0520	274.56	19.231	4.385	173.40
.0530	279.84	18.868	4.34	175.40
.0540	285.12	18.519	4.30	177.40
.0550	290.40	18.182	4.26	179.40
.0560	295.68	17.857	4.225	181.40
.0570	300.96	17.544	4.19	183·40
.0580	306.24	17.241	4.15	185.40

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.0590	311.52	16.949	4.115	187.40
.0600	316.80	16.667	4.08	189.40
.0610	322.08	16.393	4.05	191.22
.0620	327.36	16.129	4.015	193.04
.0630	332.64	15.873	3.985	194.86
.0640	337.92	15.625	3.95	196.68
.0650	343.20	15.385	3.92	198.50
.0660	348.48	15.152	3.89	200.32
.0670	353.76	14.925	3.86	202.14
.0680	359.04	14.706	3.83	203.96
.0690	364.32	14.493	3.81	205.78
.0700	369.60	14.286	3.78	207.60
.0710	374.88	14.085	3.75	209.29
.0720	380.16	13.889	3.73	210.98
.0730	385.44	13.699	3.70	212.67
.0740	390.72	13.514	3.68	214.36
.0750	396.00	13.333	3.65	216.05
.0760	401.28	13.158	3.63	217.74
.0770	406.56	12.987	3.60	219.43
.0780	411.84	12.821	3.58	221.12
.0790	417.12	12.658	3.56	222.80
.0800	422.40	12.500	3.54	224.48
.0810	427.68	12.346	3.51	226.16
.0820	432.96	12.195	3.49	227.83
.0830	438.24	12.048	3.47	229.51
.0840	443.52	11.905	3.45	231.19
.0850	448.80	11.765	3.43	232.87
.0860	454.08	11.628	3.41	234.54
.0870	459.36	11.494	3.39	236.22
.0880	464.64	11.364	3.37	237.89
.0890	469.92	11.236	3.35	239.57
.0900	475.20	11.111	3.33	241.25
.0910	480.48	10.989	3.31	242.90
.0920	485.76	10.870	3.30	244.55
.0930	491.04	10.753	3.28	246.20
.0940	496.32	10.638	3.26	247.85
.0950	501.60	10.526	3.24	249.41
.0960	506.88	10.417	3.23	250.98
.0970	512.16	10.309	3.21	252.55
.0980	517.44	10.204	3.194	254.11
.0990	522.72	10.101	3.178	255.68
.1000	528.00	10.000	3.162	257.24
.1010	533.28	9.901	3.146	258.72
.1020	538.56	9.804	3.130	260.21
.1030	543.84	9.709	3.116	261.70
.1040	549.12	9.615	3.101	263.19
.1050	554.40	9.524	3.086	264.68

S Sine of the Slope = $\frac{h}{l}$	F Fall per Mile in Feet.	$\frac{1}{S}=I$ Mean Hydraulic Inclination $\frac{l}{h}$ One Inch.	$\left(\frac{1}{S}\right)^{½}=\sqrt{I}$ or $\sqrt{\frac{l}{h}}$	Velocity in Inches per Second in 12″ Pipe.
.1060	559.68	9.434	3.071	266.17
.1070	564.96	9.346	3.057	267.66
.1080	570.24	9.259	3.043	269.15
.1090	575.52	9.174	3.028	270.64
.1100	580.80	9.091	3.015	272.13
.1110	586.08	9.009	3.001	273.60
.1120	591.36	8.929	2.988	275.06
.1130	596.64	8.850	2.975	276.53
.1140	601.92	8.772	2.961	277.99
.1150	607.20	8.696	2.948	279.46
.1160	612.48	8.621	2.936	280.87
.1170	617.76	8.547	2.923	282.29
.1180	623.04	8.475	2.911	283.70
.1190	628.32	8.403	2.898	285.12
.1200	633.60	8.333	2.886	286.53
.1210	638.88	8.265	2.874	287.92
.1220	644.16	8.197	2.862	289.31
.1230	649.44	8.130	2.851	290.70
.1240	654.72	8.065	2.839	292.09
.1250	660.00	8.000	2.828	293.48
.1260	665.28	7.937	2.817	294.86
.1270	670.56	7.874	2.805	296.24
.1280	675.84	7.812	2.795	297.62
.1290	681.12	7.752	2.784	299.00
.1300	686.40	7.692	2.773	300.38
.1310	691.68	7.634	2.762	301.75
.1320	696.96	7.576	2.752	303.12
.1330	702.24	7.519	2.742	304.49
.1340	707.52	7.463	2.731	305.86
.1350	712.80	7.407	2.721	307.23
.1360	718.08	7.353	2.711	308.55
.1370	723.36	7.299	2.702	309.86
.1380	728.64	7.246	2.692	311.18
.1390	733.92	7.194	2.681	312.49
.1400	739.20	7.143	2.672	313.81
.1410	744.48	7.092	2.663	315.10
.1420	749.76	7.042	2.653	316.39
.1430	755.04	6.993	2.644	317.68
.1440	760.32	6.944	2.634	318.98
.1450	765.60	6.897	2.626	320.27
.1460	770.88	6.849	2.617	321.53
.1470	776.16	6.803	2.608	322.79
.1480	781.44	6.757	2.600	324.05
.1490	786.72	6.711	2.590	325.31
.1500	792.00	6.667	2.582	326.57

For double the inclination add 40 per cent.

TABLE II

Is a universal table, by which—with the aid of table 1—the velocity and discharge may be readily obtained for any pipe from 1 inch to 12 feet in diameter, with any inclination.

The columns of multipliers for velocity and discharge give respectively the relation between the velocity in a 12 inch pipe and that in other pipes, and between the velocity in a 12 inch pipe and the discharge in any pipe whose diameter is given in the table.

The application of the tables in practice is very simple. It is only necessary to multiply the velocity, given in table 1 for a 12 inch pipe, by the multiplier set opposite to the diameter of the required pipe or sewer in table 2, either for velocity or discharge.

EXAMPLE 1.—Required the velocity and discharge through a 10 inch pipe one mile long with a head of 66 feet.

The velocity in a 12 inch pipe by table 1 is 73.52 inches per second, and the multiplier for velocity in a 10 inch pipe by table 2 is 0.9075:

$73.52 \times 0.9075 = 66.72$ inches per second, the required velocity.

For discharge the multiplier by table 2 is 2.474:

$73.52 \times 2.474 = 181.89$ cubic feet per minute, the required discharge.

EXAMPLE 2.—Required velocity and discharge through a sewer 4 feet in diameter, falling at the rate of .05 per 100.

From the tables we obtain:

$11.73 \times 2.0615 = 24.18$ inches per second, and

$11.73 \times 129.5 = 1519$ cubic feet per minute.

TABLE 2.

Diameter.	Areas.	Multipliers for Velocity.	Multipliers for Discharge.
Ft. In.	Square Feet.	Inches per Second.	C Feet per Minute
½	....	....	.0011
1	.005454	.2450	.0067
2	.021816	.3719	.0406
3	.04909	.4693	.1150
4	.08726	.5514	.2405
5	.13635	.6208	.4229
6	.19635	.6891	.6766
7	.26725	.7470	.9984
8	.3490	.8052	1.405
9	.4418	.8562	1.891
10	.5454	.9075	2.474
1—0	.7854	1.090	3.927
1—2	1.0690	1.085	5.799
1—3	....		6.700
1—4	1.3962	1.164	8.127
1—6	1.7671	1.238	10.942
1—8	2.1816	1.308	14.276
1—10	2.6398	1.375	18.157
2—0	3.1416	1.439	22.611
2—2	3.6869	1.494	27.541
2—4	4.2760	1.560	33.352
2—6	4.9087	1.620	39.76
2—8	5.5850	1.672	46.69
3—0	7.0686	1.777	62.80
3—4	8.7265	1.876	81.87
3—8	10.5591	1.971	104.07
4—0	12.5664	2.061	129.52
5—0	19.6350	2.312	226.98
6—0	28.2744	2.538	358.85
7—0	38.4846	2.746	528.54
8—0	50.2656	2.940	739.05
10—0	78.5400	3.295	1293.9
12—0	113.0976	3.615	2044.4

For Egg-Shaped Sewers.—Where the diameter of the large circle or crown equals two-thirds of the heighth of the sewer, the radius of the invert equals half the radius of the crown, and the radii of the sides equal the height of the sewer—the discharges when running full, two-thirds, half and one-third full, may be found—approximately in the following way:

Find the discharge through a cylindrical sewer having the same diameter as that of the crown of the egg-shaped sewer; when flowing full $\times$ the result by 1.5; when flowing two-thirds full $\times$ by 1.0; when flowing half full $\times$ by 0.75, and when flowing one-third full $\times$ by 0.3.

Example.—Required the discharge through an egg-shaped sewer 4′ 0″ x 6′ 0″ with an inclination of 1 in 5000.

From table 1 we obtain 7.04, and from table 2 the multiplier for a 4 foot sewer is 129.5; the results would therefore be, for a 4′ 0″ x 6′ 0″ sewer

$7.04 \times 129.5 \times 1.5 = 1367$ c. ft. per m., when full.
$7.04 \times 129.5 \times 1.0 = 911$ c. ft. per m., when $\frac{2}{3}$ full.
$7.04 \times 129.5 \times 0.75 = 683$ c. ft. per m., when $\frac{1}{2}$ full.
$7.04 \times 129.5 \times 0.3 = 273$ c. ft. per m., when $\frac{1}{3}$ full.